GEOGRAPHIC SCHOOL BULLETINS

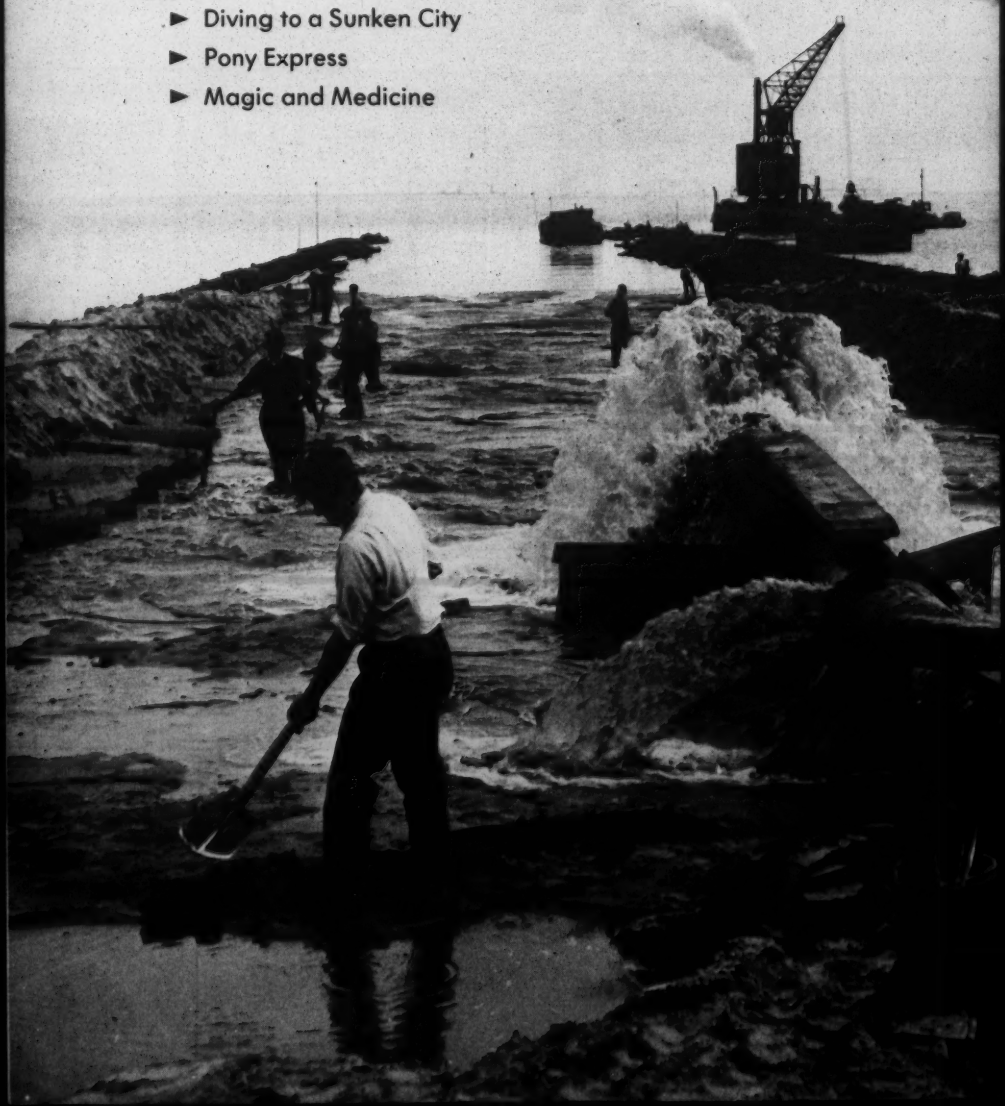
THE NATIONAL GEOGRAPHIC SOCIETY, WASHINGTON 6, D.C.

FEBRUARY 15, 1960, VOLUME 38, NUMBER 18 . . . *To Know This World, Its Life*

Dutch Wrest Land from the Sea

also —

- ► Diving to a Sunken City
- ► Pony Express
- ► Magic and Medicine



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PORT ROYAL TODAY — Dotted line encloses the section sunk by 17th-century earthquake. Kingston (background) took over the old port's governmental and trade role. Below, the expedition leader surveys a treasure-trove of relics brought to light after 300 years.

barge a more fragile find, a terra cotta dish.

Edwin A. Link, deep-sea explorer and inventor of the Link Trainer, led the expedition. At right, he inspects the most important relics on a Port Royal pier. He and his wife, Marion, author of the *National Geographic* article "Exploring the Drowned City of Port Royal" (February, 1960), had paid a preliminary visit to Jamaica in 1956. To their converted shrimp boat, *Sea Diver,* they raised a cannon from a sunken fort. Last summer they returned in *Sea Diver II,* a new 91-foot research yacht designed for underwater archeological work. They were sponsored by the National Geographic Society, the Smithsonian Institution, and the Institute of Jamaica.

With the aid of a homemade chart of the pre-earthquake city, sounding equipment, and the air-operated dredge, the divers were able to discover a vanished way of life.

They worked among sea urchins, sting rays, eels, and scorpion fish lurking on the muddy bottom. Sharks and barracuda swam near the surface. In the clouded water, divers could barely see a hand held in front of the face. During more than two months' work, the water was clear enough for submarine color photography on only

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PORT ROYAL

Divers Probe A Pirate Lair

Photographs by Luis Marden, National Geographic Staff

The "wickedest city in the world," they called it.

A trade hub between the Old and New Worlds 300 years ago, Port Royal, nestling on a Jamaican sandspit, was also headquarters for pirates. Henry Morgan, Teach, Laffite, Kidd, back from raids on the Spanish Main, dumped their booty on its beaches. Merchant-accomplices stored it in safes and warehouses already overflowing with loot—gold and silver bars, church plate, elaborately set jewels, rich silks and brocades.

Gambling thrived, and taverns lined the streets. Although by the near-end of the 17th century pirates were no longer welcome in Port Royal, a local minister still described the city's citizens as "a most ungodly, debauched people."

Then just before noon, on June 7, 1692, a shudder shook a wooden wharf. From the mountains came a hollow rumbling noise like distant thunder—and a violent earthquake shock. It was followed almost immediately by a second and a third. The whole waterfront was launched into the sea. Houses crumpled and disappeared as the land beneath them slid toward the water. Deep crevices tore the earth, devouring broken buildings and panic-stricken people. A great wave formed, swelled, and rolled in from the sea, flooding the section of town that survived.

More than 2,000 people lost their lives. When the terrifying convulsions ceased, almost two-thirds of the storybook city had disappeared beneath the sea, its sins buried with it under the blue-green water of the Caribbean.

But not forever. Last summer, the sunken city knew human inhabitants again. A National Geographic-Smithsonian-Link Expedition spent 10 weeks bringing pieces of the city up from the bottom of the sea. The suction pump, above, spouting brine, silt, and occasionally bricks, probes Port Royal's foundations as a diver delivers to the

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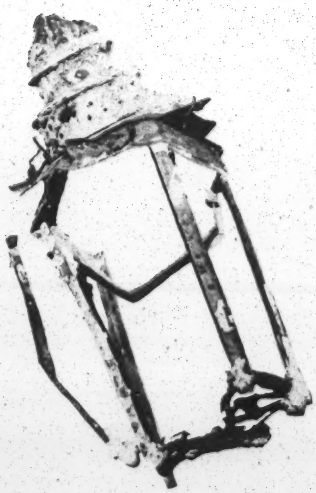
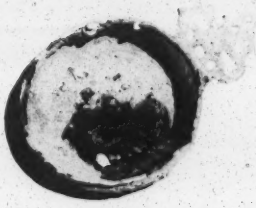




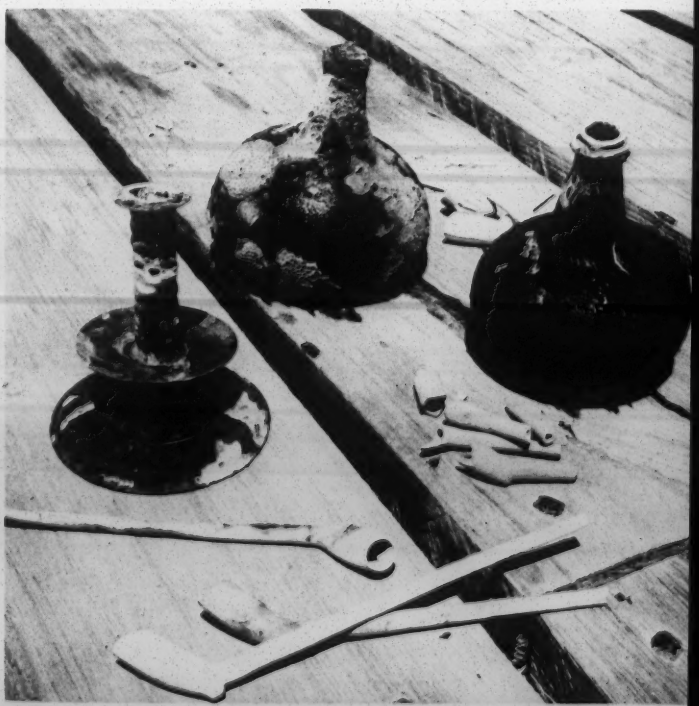
WHEN PORT ROYAL WAS FLUNG into the sea and destroyed, it paradoxically was "saved" for archeology. A 17th-century town on land would have been changed beyond recognition by man, or crumbled by the elements. Port Royal, protected by blankets of water and mud, needs only to have its pieces put together to live once more in imagination.

The bent copper lantern (left) may have lighted the way home for a sailor the night before both his town and ship were smashed. Or it may have served the Redcoats of the fort as they made their sentry rounds.

Perhaps the pewter porringer (left) held lunchtime cereal for a child who never lived to see noon.

In what was apparently the kitchen of a tavern or restaurant were found the brass candlestick and wine bottles below, calling to mind a scene of merchants and able seamen talking and laughing as the flickering light echoed from glass and polished metal.

Wealthy international traders, we suppose, relaxed after heavy meals of beef and turtle meat by puffing on the long clay pipes. Often, such pipes were supplied by the inn, and each new user broke off a bit of the stem to give himself a clean mouthpiece.



RELICS wrenched from the grasp of the sea lie on a wooden wharf, the latest fruit of dives into the past. Underwater archeology, newest tool of an ancient science, is also treated at length in these earlier *National Geographic* articles: "Up from the Well of Time" and "Dzibilchaltun: Lost City of the Maya," January, 1959 ($1); "I Found the Bones of the *Bounty*," December, 1957 ($1); "Fish Men Discover a 2,200-year-old Greek Ship," January, 1954 ($1).

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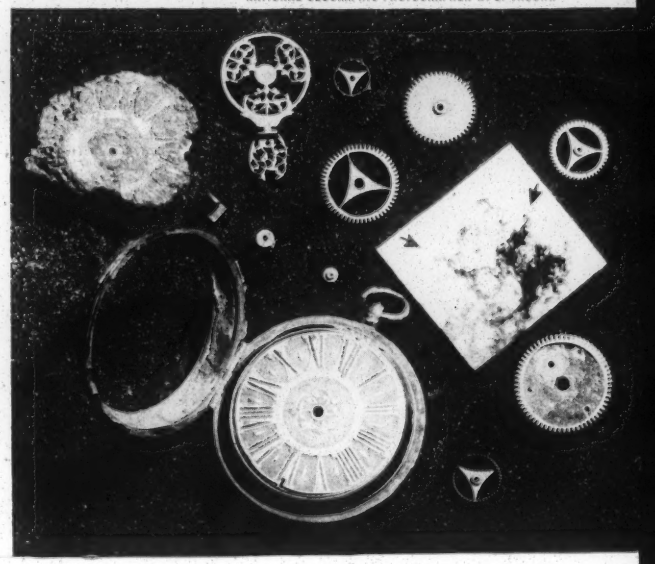
Caribbean floor yields picture of 17th-century life

a couple of days. When hydrojets and suction hose stirred up harbor muck, the men worked by touch alone (above).

The expedition learned much about the sunken city. Shattered buildings were located, and the most accurate existing map of pre-earthquake Port Royal was drafted. Hundreds of relics of 17th-century Jamaica crowded *Sea Diver*'s deck, including a cooking pot with the bones of a 268-year-old lunch in it and a pocket watch which apparently stopped at the moment of the tragedy.

There is much left to find. Unexplored houses, taverns, warehouses, docks, sunken ships, and shops lie beneath the Caribbean, making Port Royal still a rich archeological site. The Links hope to return to its fascinating jigsaw puzzle. L.B.

NATIONAL GEOGRAPHIC PHOTOGRAPHER W. D. VAUGHN



THE MOMENT OF DOOM—This elegant brass watch, brought out of the depths by the suction pump, was miraculously undamaged. Traced to its manufacturer, the watch proved to have been made in or before 1686. An X-ray photograph (right) revealed the vanished hands had stopped at 11:43, the moment of the earthquake. Its brass gears remain as bright as the day they were made.

PONY EXPRESS *100 Years Ago It Galloped to California—and Fame*

WITH A WHOOP AND A HOLLER the Pony Express rider gallops past a telegraph line gang. The friendly wave disguises unhappiness, for he knows the transcontinental "wire rope express" will soon put him out of business.

The Pony Express lasted only a year and a half. But that was long enough to write a legend. In 1860 the Far West was filling up. Some half-million pioneer settlers longed for word from home and news of the gathering storm between North and South.

Mail to the West was snail slow. A letter from New York might take six months by ship via the Isthmus of Panama, or three weeks by stage from St. Louis.

The experienced wagon freight firm of Russell, Majors, and Waddell bet it could do better. When a California Senator appealed to the company, it accepted the challenge, and fitted up the "Central Overland California and Pike's Peak Company."

Advertisements called for 80 "expert riders willing to risk death daily." The firm bought 500 spirited horses, mostly California mustangs. It laid out the route, almost 2,000 miles from St. Joseph, Missouri, where the railroad ended, to Sacramento. Along the way sprouted 190 "stations," to provide new riders and fresh mounts.

A century ago, on April 3, 1860, a band blared and the crowd cheered as Johnnie Frey, the first rider, spurred his horse down St. Joseph streets where this Pony Express statue now stands. In his padlocked saddlebags rode 20 pounds of precious mail, written on wafer-thin paper to save weight.

In unbroken sequence, he and riders who took over as each man tired sped across the lonely land, spanning rolling Nebraska prairie, following wagon trails along river valleys, leaping astride new mounts at places like Fremont Springs, O'Fallon's Bluffs, Beauvais, and Diamond Springs. Reaching famed South Pass, they picked their way through Rocky Mountain chasms, raced down the western slope to Great Salt Lake, kicked up alkali dust on the desert, finally galloped into the snow-swept Sierras to reach golden California. Average speed: almost 11 miles an hour! San Franciscans gladly paid $5 an ounce to get letters through in nine days or better.

Despite hostile Indians, wolves, mountain lions, and blizzards, only one mail was lost and one man killed on duty. Short on weight, riders were long on courage. Most carried a brace of Colt pistols, but relied chiefly on their pony's speed to get out of trouble.

As the telegraph marched West, the need for the Pony Express faded. For its backers it was a financial failure. For the nation, it proved a rousing success. Its riders marked a path for railroads to follow. Most important, the fast mail helped cinch tight the newly won West to the embattled Union.

A.P.M.

RALPH GRAY, NGS STAFF; BUREAU OF PUBLIC ROADS, LEFT

Yet along with the hocus-pocus, American Indians, through centuries of trial and error with the native plants, had learned many useful things. About 50 of their healing plants are in use in modern pharmacy.

Doctors in the field have learned not to scorn even apparently ridiculous rituals. In the Mentawai Islands, southwest of Sumatra, dysentery sufferers are told to lie face down in the sun on the edge of a certain cliff and lick the earth. The warm cliff acts as a heating pad. The soil contains kaolin, an effective medicine for the ailment and the basis of the potion any civilized doctor might prescribe.

Often the value of a folk cure cannot be so easily seen. It may take months or years of tests to find the active ingredient, in, say, "white tiger soup," a potion brewed by Chinese herb healers (below) to cure encephalitis. It contains gypsum, rice powder, dried gold-and-silver blossoms, wild buds, mulberry leaves, roots of two other plants, camphor, ginseng root, and a fragrant orchid.

The ancient Chinese placed a strong reliance on toadskins—a seemingly barbaric remedy. Research has shown that when a warrior put the skins on his wounds, he was using the best thing available—the skins contain epinephrine, a compound still used to stop bleeding and to stimulate the action of the heart.

Ground up and taken internally, the skins proved good for dropsy—they are rich in two chemicals that help drain the tissues of excess water and increase blood pressure.

Centuries later, Europeans were also interested in the medical properties of toads, believing they carried in their heads precious stones that had curative powers (see 15th-century woodcut above). It is an interesting example of the strength of belief, since anyone with a toad handy could have found out it was not true. F.S.

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PAUL ALMASY, THREE LIONS; WASSA JORDAN, BELOW

SNAKEROOT, TOADS, AND TIGER SOUP

Modern Doctors Consult Medicine Men

DON'T SNEER at the Madagascar medicine man as he lays out his mumbo-jumbo of magic seeds to learn the cause of an illness.

The chances are that after he's finished he will be respectfully interviewed by a traveling M. D. anxious to learn about any herb cures he may use.

Around the world, these days, the medicine man—in one sense the grandfather of modern medicine—is getting a great deal of attention from his "grandchildren," who have decided the old boy may not always be the stupid savage he was formerly believed.

Medical explorers leave their spotless laboratories, electron microscopes, and brilliantly educated co-workers to sit humbly with shamans, healers, witches, and witch doctors and pick their brains.

Many of the secrets they pry out are valueless. But others are not. For example, back-country practitioners in India have been prescribing snakeroot for 2,000 years. In 1952, Westerners started to pay attention. From the plant, they extracted the first of the tranquilizing drugs, now used for ailments ranging from insomnia to insanity. This discovery loosed an army of medical explorers; roots, leaves, stems, and seeds are pouring into pharmaceutical houses in every mail.

Exhaustive laboratory tests have confirmed the powers of a number of them as anesthetics, stimulants, and balms. A few have even shown some signs of retarding the growth of cancers.

One of the best discoveries of modern medicine was anticipated by the Ainu of Japan, who treated cuts with a fungus now known to contain an antibiotic.

Separating the superstitions from the practical medicine of tribal practitioners is not an easy task.

Many New World Indians believe serious illness is caused by something—such as a frog, a pebble, or a thorn—entering the body. Witches are often behind such an occurrence, and tobacco smoke blown on the affected part is a good way of getting rid of it, they feel.

11,000,000 Netherlanders dry—if not high.

The Zuider Zee, a bay of the North Sea pushing into Dutch territory, was an inland lake in the Middle Ages. Then a series of floods, climaxed by one gigantic deluge that covered 50 towns on Christmas Day, 1270, linked lake to ocean.

Now the Dutch have turned it back into a freshwater lake—IJssel Meer—fed by the IJssel River. They cut it off from the sea by building a dam across its mouth. They pumped out the water and poured in fill (see cover) until they created a series of *polders*—Dutch for land reclaimed from the sea.

Areas shown in black on the map are finished polders. Not only do farms flourish on this "sea bottom," but whole communities, planned for modern living, thrive. Trucks take the beets to sugar factories and the potatoes to market over brick or concrete roads. Church spires, schools, and shops stand on once-drowned land. The farmer's wife and children swim in a pool, skate on a rink, and relax in a movie.

When the dotted polders are complete (scheduled for 1970), the lowlanders will have reclaimed some 550,000 acres of land where 1,000,000 people can live and farm.

While the Dutch disarmed the sea in the northwest, water in the southwest

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PHOTOGRAPHS FROM NETHERLANDS EMBASSY THIS PAGE AND COVER

NETHERLANDERS BATTLE THE TIDES

New Farms from the Zuider Zee

WORKERS ABOVE LAY the willow "mattress" on which a dike will rest. Rocks anchor the foundation, forming a strong sea wall (below). A tough watertight asphalt skin will cover it.

At first glance the sequence does not seem very dramatic. But for the Dutch it is a life-and-death struggle, and they are winning important battles.

The Netherlands begins to see final victory over the tides that have been the country's fiercest and most constant enemy. The nation continues to push the water away from its door.

Today's battles have come a long way since the legendary little boy held his finger in the dike. Today the Dutch wage preventive war, building more and more dikes, and wresting more and more land from the bottom of the sea.

Well-equipped laboratories bustle as scientists work behind their front lines studying wave formations, tides, and dikes, always searching for new processes and stronger materials, fresh weapons to put a new ending on an old story.

About a quarter of the Netherlands lies below sea level. Windmills, like those lining the canals below, pump out water, and dikes hold back the sea. Together they keep

SEA MELTS INTO FARMS—Schokland (left) was an island surrounded by the Zuider Zee in 1937. Now its sea-horse shape is imbedded, below, in a checkerboard of fertile farmland reclaimed from the sea.

NETHERLANDS EMBASSY

continued to harass them. This delta section of the country is cut up into several islands with inlets into which storms of the North Sea drive devastating tides.

In 1953 the most disastrous flood in modern times broke through the dikes, destroying 133 villages and killing 1,800 people. As the Dutch pulled themselves out of the mud, they swore it would never happen again.

Their 25-year Delta Plan, scheduled for completion in 1978, will close off four inlets by superdikes linking island to island. The fifth will be left open to serve Belgium's bustling seaport of Antwerp.

In addition to the new dikes (shown on the map by the straight lines connecting the islands), the miles of old dikes behind them are being reinforced—just in case.

But there are those in the Netherlands now who see neither the reclaimed Zuider Zee nor the Delta Plan as the end of the battle. Men are now talking about the Zuider Zee dam as only a second line of defense. They envision other dikes far off the country's northern coast to link the West Frisian Islands and turn Wadden Zee into a lake. L.B.

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